

## Test 3 reflection

### **Problem 1**

This problem helped me better understand how fluid mechanics applies to wind loading on structures. I learned how to convert wind speed into dynamic pressure and then determine the drag force acting on different pipe sections. From there, I calculated the bending moment at the base of the pole. This problem strengthened my understanding of force and moment calculations and showed how fluid flow can affect structural design. I found that carefully converting units and using the correct pipe dimensions were essential for obtaining an accurate answer. In the future, I will double-check all conversions and dimensions before starting the calculations.

### **Problem 2**

This problem improved my understanding of open channel flow and Manning's equation. I learned how to determine the normal depth using an iterative method and then calculate the average velocity and Froude number to classify the flow. The iterative process took several attempts before reaching the correct depth, which helped me become more comfortable with trial and error calculations. This problem also reinforced the importance of checking whether the flow is subcritical or supercritical. Next time, I will organize my iterations more clearly to reduce calculation errors and make the solution easier to follow.

This problem helped me understand how an orifice meter flows by creating a pressure difference. I applied the continuity equation and Bernoulli's equation to relate the flow rate to the manometer reading. I also learned how the diameter ratio and discharge coefficient influence the pressure difference across the orifice plate. This exercise improved my understanding of flow

measurement devices used in engineering systems. In the future, I will pay closer attention to unit conversions and equation substitutions to avoid small calculation mistakes.

This problem gave me a better understanding of how pressure and momentum affect the forces acting on pipe bends. I first used Bernoulli's equation to determine the fluid velocity and then applied the linear momentum equation to calculate the reaction forces on the curved pipe. This showed me how changes in flow direction create forces that must be considered when designing piping systems. I learned the importance of selecting the correct control volume and maintaining a consistent sign convention. Next time, I will carefully sketch the force directions before solving the momentum equations.

This problem introduced me to the effects of water hammer caused by the sudden closure of a valve. I learned how the compressibility of water and the elasticity of the pipe influence the pressure wave generated in the system. By calculating the wave speed and pressure increase, I gained a better understanding of why sudden valve closures can damage pipelines. This problem demonstrated the importance of transient flow analysis in pipe system design. In future problems, I will carefully check material properties and unit conversions because they have a significant effect on the final pressure calculation.

#### PROBLEM 1

- |                                   |                |
|-----------------------------------|----------------|
| 1. Moment with respect to A       | 1/5 out of 1/5 |
| 2. Correct distances              | 1/5 out of 1/5 |
| 3. Correct Cd using Re and forces | 2/5 out of 2/5 |
| 4. Results                        | 0/5 out of 1/5 |

**TOTAL** **4/5 out of 5/5**

PROBLEM 2

1. Correct Q equations (look at constant) 1/6 out of 1/6
2. Correct A and Hydraulic radius R 1/6 out of 1/6
3. Solving by iteration 2/6 out of 2/6
4. Is it critical? 1/6 out of 1/6
5. Results 0/6 out of 1/6

**TOTAL** **5/6 out of 6/6**

PROBLEM 3

1. Correct eq for Q for nozzle 1/5 out of 1/5
2. Use Re to get C 1/5 out of 1/5
3. Solving by “h” 2/5 out of 2/5
4. Results 0/5 out of 1/5

**TOTAL** **4/5 out of 5/5**

PROBLEM 4)

1. Compute pressures using Bernoulli's 1/7 out of 1/7
2. Compute height with length 0/7 out of 1/7
3. Appropriate control volume? 1/7 out of 1/7

- |  |                |
|--|----------------|
| 4. Rx (be careful with velocity direction) | 1/7 out of 1/7 |
| 5. Ry (be careful with velocity direction) | 1/7 out of 1/7 |
| 6. Compute Q with Bernoulli's              | 1/7 out of 1/7 |
| 7. Results                                 | 0/7 out of 1/7 |

**TOTAL** **5/7 out of 7/7**

#### PROBLEM 5

- |                                      |                |
|--------------------------------------|----------------|
| 1. Correct C (be careful with units) | 2/4 out of 2/4 |
| 2. deltaP                            | 1/4 out of 1/4 |
| 3. Results                           | 0/4 out of 1/4 |

**TOTAL** **3/4 out of 4/4**

$$(90/5) * (4/5 + 5/6 + 4/5 + 5/7 + 3/4) = 70.2$$